Claim Rejections - 35 USC §102

The Examiner rejects Claims 1-2 and 6 under 35 USC §102(b) as being anticipated by Yamazaki et al. '080. This rejection is respectfully traversed.

Applicant has amended independent Claim 1 to recite that the first laser beam is a third harmonic of a first YAG laser and that the second laser beam is a second harmonic of a second YAG laser beam. This is supported in the specification of the present application at, for example, Embodiment 5 at pages 21-22.

Yamazaki '080 does not disclose or suggest either of these features. Accordingly, Claims 1-2 and 6 are not anticipated by, nor would they be obvious over, Yamazaki '080. Therefore, it is requested that this rejection be withdrawn, and these claims allowed.

Claim Rejections - 35 USC §103

The Examiner has a number of §103 rejections. Applicant believes this submission should overcome each rejection as explained in more detail below.

(a) The Examiner rejects dependent Claim 7 under 35 USC §103 as being unpatentable over Yamazaki '080. This rejection is respectfully traversed. For substantially the same reasons discussed above for independent Claim 1, dependent Claim 7 would also be patentable over this reference and should now be allowed.

(b) The Examiner further rejects Claims 3 and 8-9 under 35 USC §103 as being unpatentable over Yamazaki '080 in view of Yamazaki et al. '730. This rejection is also respectfully traversed.

Applicant has amended independent Claim 3 to recite that the first laser beam is a YVO_4 laser and the second laser beam is a YAG laser. This is supported in the specification, for example,

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at page 12. Neither of the cited references disclose these features. Accordingly, independent Claim 3 and the claims dependent thereon are patentable over these references and should now be allowed.

(c) The Examiner further rejects Claims 4 and 10-11 under 35 USC §103 as being unpatentable over Yamazaki '080 in view of Yamazaki et al. '084. This rejection is also respectfully traversed.

Applicant has amended independent Claim 4 to recite that the first laser beam is a YVO_4 laser. This is supported in the specification, for example, at page 12. Neither of the cited references disclose this feature. Accordingly, independent Claim 4 and the claims dependent thereon are patentable over these references and should now be allowed.

(d) The Examiner further rejects Claims 5 and 12-13 under 35 USC §103 as being unpatentable over Yamazaki '080 in view of Yamazaki '730 and further in view of Yamazaki '084. This rejection is also traversed.

As explained in the background of the invention in the present application (see e.g. pages 5-6), a XeCl excimer laser with a wavelength of 308 nm has often been used for manufacturing a semiconductor film. Such a laser beam has approximately the same absorption coefficient with respect to an amorphous silicon film and a polycrystalline silicon film (see page 7). As a result, there is overlapping irradiation, and recrystallization of already crystallized portions repeatedly occurs. This causes fluctuation in grain size. Further, it is difficult to uniformly crystallize an amorphous semiconductor film using YAG laser light having strong coherence.

Applicant, however, has overcome these drawbacks with the methods of the present invention, such as that recited in independent Claim 5. More specifically, in the method of Claim 5, the amorphous semiconductor film is irradiating with a first laser beam, which is 126 to 370 nm

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in wavelength, to form a first crystalline semiconductor film. This first laser beam is absorbed in the amorphous silicon film and the polycrystalline silicon film to approximately the same extent. In the next step, the first crystalline semiconductor film is irradiated with a second laser beam, which is 370 to 650 nm in wavelength, to form a second crystalline semiconductor film. This second laser beam is absorbed more in the amorphous silicon film than in the polycrystalline silicon film and as a result, forms a more uniform crystalline semiconductor film than with prior methods. See e.g. page 9 of the specification.

None of the cited references disclose or suggest these features nor would it have been obvious to arrive at a method having all of these features. Accordingly, it is respectfully submitted that independent Claim 5 and those claims dependent thereon are patentable over the cited references and should now be allowed.

For at least the above-stated reasons, it is respectfully requested that the rejection of the claims over these references be withdrawn, and the claims allowed.

IDS

Applicant is submitting a new reference, U.S. 6,410,374, in an IDS herewith. Applicant is submitting a check for $180 with the IDS. It is respectfully requested that the Examiner consider this reference when responding to this Amendment.

Conclusion

For at least the above-stated reasons, it is respectfully submitted that the present application is now in condition for allowance and should be allowed.

If any further fee is due for this amendment, please charge our deposit account 50/1039.

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Favorable reconsideration is earnestly solicited.

Respectfully submitted,

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Marked-up copy of the claims as amended:

IN THE CLAIMS:

Please amend the claims as follows:

1 (Amended). A method of manufacturing a semiconductor device, comprising [the steps of]:

forming an amorphous semiconductor film over a substrate;

irradiating the amorphous semiconductor film with a first laser beam to form a first crystalline semiconductor film; and

irradiating the first crystalline semiconductor film with a second laser beam to form a second crystalline semiconductor film,

wherein the first laser beam is a third harmonic of a first YAG laser, and

wherein in the second laser beam is a second harmonic of a second YAG laser.

3 (Amended). A method of manufacturing a semiconductor device, comprising [the steps of]:

forming an amorphous semiconductor film over a substrate;

irradiating the amorphous semiconductor film with a first laser beam to form a first crystalline semiconductor film; and

irradiating the first crystalline semiconductor film with a second laser beam to form a second crystalline semiconductor film,

wherein the first laser beam is [126 to 370 nm in wavelength] a YVO_4 laser, and

wherein the second laser beam is a YAG laser.

4 (Amended). A method of manufacturing a semiconductor device, comprising [the steps of]:

forming an amorphous semiconductor film over a substrate;

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irradiating the amorphous semiconductor film with a first laser beam to form a first crystalline semiconductor film; and

irradiating the first crystalline semiconductor film with a second laser beam to form a second crystalline semiconductor film, wherein

the second laser beam is 370 to 650 nm in wavelength, and

wherein the first laser beam is a YVO_4 laser.

6 (Amended). A method according to claim 1, wherein the semiconductor device is incorporated into a device selected from the group consisting of a liquid crystal display device [or] and a light emitting device.

7 (Amended). A method according to claim 1, wherein the semiconductor device is incorporated into a device selected from the group consisting of a cellular phone, a video camera, a digital camera, a projector, a goggle type display, a personal computer, a DVD player, an electronic book, [or] and a portable information terminal.

8 (Amended). A method according to claim 3, wherein the semiconductor device is incorporated into a device selected from the group consisting of a liquid crystal display device [or] and a light emitting device.

9 (Amended). A method according to claim 3, wherein the semiconductor device is incorporated into a device selected from the group consisting of a cellular phone, a video camera, a digital camera, a projector, a goggle type display, a personal computer, a DVD player, an electronic book, [or] and a portable information terminal.

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10 (Amended). A method according to claim 4, wherein the semiconductor device is incorporated into a device selected from the group consisting of a liquid crystal display device [or] and a light emitting device.

11 (Amended). A method according to claim 4, wherein the semiconductor device is incorporated into a device selected from the group consisting of a cellular phone, a video camera, a digital camera, a projector, a goggle type display, a personal computer, a DVD player, an electronic book, [or] and a portable information terminal.

12 (Amended). A method according to claim 5, wherein the semiconductor device is incorporated into a device selected from the group consisting of a liquid crystal display device [or] and a light emitting device.

13 (Amended). A method according to claim 5, wherein the semiconductor device is incorporated into a device selected from the group consisting of a cellular phone, a video camera, a digital camera, a projector, a goggle type display, a personal computer, a DVD player, an electronic book, [or] and a portable information terminal.

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